

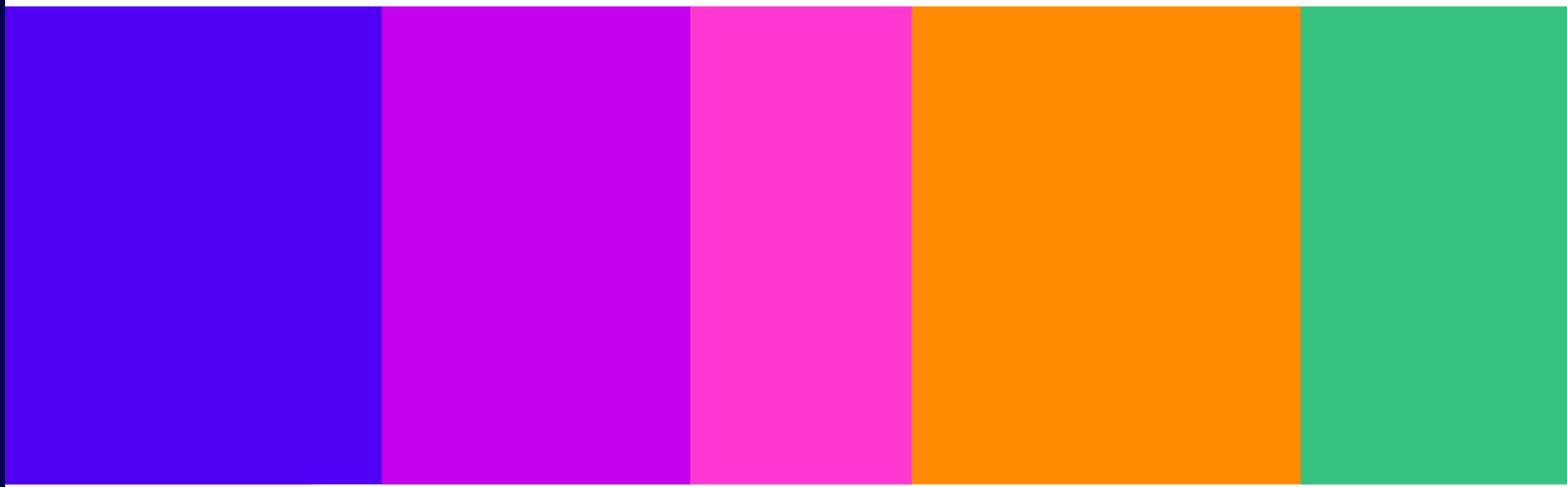
Kepler Communications Inc: application for NGSO earth station network licence

Request for comments

Consultation

Published 22 March 2024

Closing date for responses: 29 April 2024



Contents

Section

1. Overview.....	3
2. Assessment of application.....	5
3. Next steps.....	11

Annex

A1 Responding to this consultation.....	12
A2 Ofcom’s consultation principles.....	14
A3 Consultation coversheet	15
A4 Consultation questions.....	16

1. Overview

- 1.1 Non-geostationary orbiting (NGSO) satellite systems are a way of delivering broadband services from space using a constellation of satellites in a low or medium Earth orbit. These satellite systems have the potential to deliver higher speeds and lower latency services.
- 1.2 As set out in our statement on [non-geostationary satellite systems](#), we have a process for considering applications for the following types of spectrum licence:
 - **Satellite (Earth Station Network):** this licence authorises an unlimited number of user terminals to connect to the NGSO system (subject to certain conditions). It also places certain conditions on the licence holder (typically a satellite operator) to coordinate with other licence-holders. We refer to this licence as a "NGSO network licence".
 - **Satellite (Non-Geostationary Earth Station):** this licence authorises gateway earth stations, which connect the NGSO system to the internet or to a private network. We refer to this licence as a "NGSO gateway licence".
- 1.3 Ofcom has received an application from Kepler Communications Inc. (Kepler) for an NGSO network licence to communicate with its constellation. This application is to cover their user terminals. Details of this application (reference: "KEPLER-NET-1") can be found under the "Applications received" section of our [website](#).
- 1.4 Kepler says it will use its network "to support a host of applications, from store and forward-based IoT services to real-time data transfer services when the network reaches full deployment". It already has 15 satellites in orbit and plans to launch a total of 140 satellites.
- 1.5 When considering applications for these licences, amongst other considerations, we take account of their impact on existing and future NGSO systems in terms of technical coexistence and competition. We publish and invite comments on applications that we are considering for authorisation. Further information about the process and how to respond to licence applications can be found in our [non-geostationary satellite earth stations licence guidance](#).
- 1.6 Kepler's constellation plans to use Ku band (14.0 – 14.5 GHz) for its terminals. At the time of writing, five satellite operators hold NGSO network licences - Mangata Edge, Network Access Associates (OneWeb), Rivada, Starlink (SpaceX) and Telesat. Of these, the Starlink and OneWeb constellations also operate in the Ku band. Details of all existing licences and other applications we have received can be found on the NGSO page of our [website](#).
- 1.7 We are publishing this document to invite comments on the Kepler application and to set out our preliminary views. We will take into account all comments received, and we are open to changing our views on the application depending on responses and evidence submitted to us as part of this process.

What we are proposing – in brief

This document sets out Ofcom's proposal to grant an NGSO network licence to Kepler Communications Inc.

We will consider any responses to this consultation before reaching a final decision on whether to grant the licence application. The deadline for comments is 5pm on 29 April 2024.

2. Assessment of application

- 2.1 In this section we consider the coexistence and competition aspects of the licence application. We outline relevant parts of the application and indicate where we would value input from stakeholders. We encourage stakeholders to read the documents submitted alongside the application.
- 2.2 Kepler has submitted three documents in support of its application. These are published on our website alongside this consultation.

Description of system

- 2.3 Kepler has previously held a UK licence for its network and operated satellite services, but the licence lapsed in May 2022. This application ("KEPLER-NET-1") covers access to the same spectrum frequencies as the previous licence (see table below).

Frequency Bands
14.0-14.25 GHz
27.5-27.8185 GHz
28.4545-28.8265 GHz
29.5-30 GHz (NGSO)

- 2.4 We required Kepler to submit a new application, using our updated process, to ensure a fresh assessment of the system's flexibility to enable coexistence with additional NGSOs and with other spectrum users. This application also puts in the public domain technical details regarding this service that future NGSO licence applicants will be able to use.
- 2.5 In its application Kepler has stated that its ability to coexist with other operators has not changed since its previous licence was granted. It has also submitted several studies to show it can coexist with the other Ku band operators.
- 2.6 The constellation will comprise 140 satellites operating at an altitude of 575 km. There will be 20 satellites operating in each of 20 orbital planes.

Coexistence

- 2.7 When issuing licences, one of Ofcom's objectives is that all authorised systems are capable of coexisting in the frequency bands they are using in common, such that they are all able to provide services to their users without experiencing harmful interference.
- 2.8 When applying for a licence, we ask applicants to demonstrate:
 - a) coexistence with existing satellite systems: applicants should demonstrate how coexistence is possible between their networks and:
 - i) existing NGSO systems that are already licensed in the UK;
 - ii) NGSO systems for which a licence application has been made and has been published for comment; and

- iii) other specific co-frequency earth stations registered with the ITU.
 - b) an ability to coexist with future NGSO systems: applicants should demonstrate the flexibility of their system to achieve coexistence with future networks. This could include the measures they would be able to put in place if another operator enters the market in the future; it could also suggest measures future networks could reasonably be expected to put in place in order to coexist.
- 2.9 A summary of Kepler’s proposed approach to coexistence is set out below. More detailed analysis of its approach to coexistence, based on technical simulation models, is set out in a document published on our website alongside this request for comments.

Coexistence with existing systems

- 2.10 Kepler says its four years of operation alongside the Starlink (SpaceX) and One Web systems under its previous licence shows it is capable of coexisting with existing NGSO satellite systems licensed in the UK. It considered that its system would have very limited impact on other licensees.
- 2.11 Kepler says it has actively engaged in coordination discussions with Starlink and OneWeb and continues to do so in the interest of ensuring an ability to coexist not only within the UK, but on a worldwide basis.
- 2.12 Throughout its previous operations, Kepler says it has had no technical issues or conflicts and that this ought to sufficiently demonstrate the capability of Kepler’s system to coexist. The technical analysis published alongside this document sets out scenarios for coexistence with Starlink and OneWeb operations.

“Kepler has not had technical issues or conflicts with the existing licensees in operating in the UK, which ought to sufficiently demonstrate the capability of Kepler’s system to coexist as well as the fact that Kepler’s system would have a very limited impact on the other licensees. There are therefore no concerns of coexistence with existing licensees which should prevent Kepler from re-obtaining an ESN licence in the UK.”

- 2.13 Our preliminary view is that Kepler should be able to coexist with operators of existing systems with the approach described. However, we encourage all parties to continue coordinating in good faith.

Consultation question 1:

Do you anticipate this satellite network will pose coexistence challenges to existing services?

Coexistence with future systems

- 2.14 As outlined in our statement on [non-geostationary satellite systems](#), we want to enable as many NGSO systems as possible, to provide services and increase choice for people and businesses in the UK. We therefore anticipate additional applications for NGSO licences in the future to support other NGSO systems in the UK.
- 2.15 Although we do not expect applicants to foresee the characteristics or the number of systems that will be subject to a future licence application in the UK, we require applicants to:

- a) explain how their existing network design and operating model might facilitate coexistence with future NGSO satellite systems and any limitations; and
 - b) outline any additional measures, which would allow improved coexistence with future systems.
- 2.16 We also request applicants to be aware that they may be expected to take reasonable measures to accommodate such future systems, in order to avoid material degradation to services in the UK.
- 2.17 In its application, Kepler says that, in order for a system to be capable of coexisting with future systems which are yet to have any clear technical parameters, a system must be flexible. It notes that Ofcom has made a prior evaluation of the Kepler system when considering its previous licence application.
- 2.18 Kepler says it integrates substantial flexibility into its system design and operations. For example, each Kepler satellite is equipped with a Kepler Software-Defined Radio (SDR) granting the capability to dynamically adjust transmission parameters on-orbit. This enables the technical flexibility for rapid and efficient adjustment of transmit power, channel centre frequencies and channel bandwidths, allowing dynamic frequency channelisation if required.
- “Kepler is... highly unlikely to pose any issues for future systems, providing sufficient flexibility to facilitate future coexistence, thus encouraging operators seeking to deploy NGSO networks in the future.”
- 2.19 Our initial view is that Kepler’s system, as described, should be capable of coexisting with future NGSO gateway and terminal operators.

Consultation question 2:

Are the measures set out by the applicant to enable coexistence with future systems reasonable?

Protection of other services

- 2.20 As outlined in our recent [statement on Satellite Earth Station Network Licences](#), we now ask applicants to provide information regarding their ability to protect other services, where relevant, in co-frequency or adjacent bands: applicants should state how their system can operate alongside Geostationary Orbiting (GSO) satellite systems; radio astronomy in the 10.6-10.7GHz band; and fixed links in the 17.7-19.7GHz band.
- 2.21 Kepler says its system can operate without causing harmful interference to, or requiring additional protection from, any other relevant service.
- Radioastronomy in the 10.6-10.7 GHz band*
- 2.22 In its application, Kepler says it will take all practicable steps to protect radio astronomy stations from harmful interference and that it will conduct its operations in compliance with the requirements set out by Ofcom and by working cooperatively with the radio astronomy community to resolve any potential interference concerns.

Geostationary satellite systems

- 2.23 Kepler notes in its application that the process of protecting GSO services from interference also has the effect of protecting Kepler from interference from GSO, as the method is based on avoidance of inline and near-inline events.
- 2.24 It says protection of GSO is achieved by avoiding transmissions from the Kepler satellites in predetermined NGSO-centric azimuth and elevations as a function of sub-satellite latitudes. This avoids an inline event with the ‘victim’ GSO earth stations. Kepler says it will coordinate with GSO fixed satellite service (FSS) earth stations in the applicable bands where the threshold conditions are met.
- 2.25 More detail can be found in the document named ‘Kepler - further information’ published alongside this consultation.

Fixed links in the 17.7-19.7GHz band

- 2.26 Kepler is not currently seeking to provide services in the Ka bands. However, where applicable, it says it will ensure co-existence and carry out coordination discussions with the objective of reaching agreements with all applicable operators.
- 2.27 We are interested in obtaining comments on Kepler’s plans for protection of other systems. Our initial view is that the application provides sufficient comfort that Kepler’s system will be capable of protecting both GSO services and fixed wireless services.

Consultation question 3:

Do you assess that the measures put forward will allow this satellite network to coexist with other services?

Competition

- 2.28 As outlined in the approach to competition in Annex 3 of our statement on NGSO licensing updates:
- “Our starting position with any competition check is to authorise applications, where possible. We have outlined that we take into account four factors:
- a) the extent of the likely risks to competition;
 - b) the potential benefits from granting NGSO licence applications;
 - c) ensuring that time and resources devoted to the licensing process are proportionate to the risks and benefits; and
 - d) that NGSO services are currently in their infancy”.
- 2.29 We have outlined below some of the risks and benefits of granting this authorisation.

Risks to competition

- 2.30 Competition concerns can arise from the constraints that an NGSO network applicant’s system might impose on existing and subsequent entrants, due to the technical barriers to coexistence between their systems (e.g. due to a lack of flexibility to respond to or avoid altogether potential interference in the design of the applicant’s systems).

2.31 If there was a limited prospect of the applicant’s system being able to technically coexist with existing and future systems, then this could lead to weakened competition and worse outcomes for consumers, such as higher prices or lower quality of service.

2.32 We set out below three potential and general risks to competition from granting a non-geostationary earth station network licence, as well as our preliminary view regarding the specifics of Kepler’s application.

Potential risk 1: User terminals create interference concerns for existing NGSO user terminals and/or gateways, resulting in weakened competition and worse outcomes for consumers

2.33 A network licence allows the licence holder to deploy user terminals anywhere in the UK. This creates a risk that a user terminal placed close to existing user terminals and/or gateways of current operators would increase the likelihood of interference. This could lead to worse outcomes for consumers in terms of reduced quality of service by one or more operators. If the quality of service of one or more satellite operators deteriorated to the point that they became ineffective competitors, this could lead to reduced choice and worse quality of service and/or higher prices for consumers.

2.34 As set out above, our preliminary view is that coexistence between Kepler’s system and existing NGSO systems is possible. Since the competition concerns outlined above would be caused by interference, our preliminary view is that potential competition risk 1 is unlikely.

Potential risk 2: User terminals are unable to coexist with future NGSO systems, creating a barrier to entry to the market and in turn restricting competition

2.35 Similar to the above, there is a risk that a new NGSO system – and in particular its deployment of user terminals around the UK – imposes constraints on subsequent entrants due to technical barriers to coexistence between its system and future systems. This could form a barrier to future entry to the market, reducing competition and consumer choice, leading to worse outcomes for consumers.

2.36 As set out above, our preliminary view is that coexistence with future NGSO systems by Kepler is possible. Since the competition concern outlined above would be created by an inability to coexist with future systems, our preliminary view is that potential competition risk 2 is unlikely.

Potential risk 3: Operators not coordinating in good faith could hinder the ability of current and future operators to provide their service

2.37 As a general point, operators not coordinating in good faith could hinder the ability of current operators to provide their service. This could also create uncertainty for potential entrants and thereby act as a barrier to entry, leading to a lessening of competition.

2.38 Our statement highlights “the importance of all operators, regardless of their filing date, working in good faith to reach coordination agreements.” Should operators fail to coordinate in good faith, we could use our enforcement powers to remedy an issue. On this basis, our preliminary view is that Ofcom is equipped through its enforcement powers to remedy situations in which one or more operators fail to coordinate in good faith. This should alleviate any concerns over the potential for competition risk 3 to materialise in relation to Kepler’s application.

2.39 On this basis, our initial view is that there would not be a material risk to competition.

Benefits

2.40 As described in our approach to competition:

“A network licence is necessary for an operator to deploy user terminals in the UK... Granting NGSO network licence applications is thus likely to benefit customers and consumers and supports Ofcom’s strategic priority to get everyone connected. Since issuing a new network licence allows market entry it also has the potential, if a service is deployed, to promote greater competition (assuming that it can coexist with other authorised systems).”

2.41 As noted above, Kepler says its system is designed to support a range of applications for the benefit of UK consumers and businesses. These range from IoT services (for store or for onward connection) to real-time data transfer services.

2.42 Our preliminary view is that Kepler’s network has the potential to provide services that provide further connectivity options to consumers in the UK, in addition to those of existing NGSO network licence holders.

Consultation question 4:

Do you believe the NGSO system in the application would benefit or harm competition between NGSO services in the UK? Please provide details.

Other concerns

2.43 Coexistence and competition are the two issues on which we expect to make our licensing decisions (as set out in the NGSO Licensing updates Statement).

Consultation question 5:

Do you have any additional concerns or comments regarding the application?

Proposal to grant application

2.44 Taking the evidence presented by Kepler and our assessment of the risks and benefits of granting this licence application, we propose to grant Kepler’s application for an Earth Station Network licence.

3. Next steps

- 3.1 Details of the application (Kepler-Net-1) are available under the “Applications received” section of [our website](#). We welcome comments on the application by 5 pm on 29 April 2024. Responses should be submitted electronically to ngso.licensing@ofcom.org.uk, using the response form indicated in Annex 1.
- 3.2 Following this, we will review responses and publish our decision.

A1 Responding to this consultation

How to respond

- A1.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 29 April 2024.
- A1.2 You can download a response form from <https://www.ofcom.org.uk/consultations-and-statements/category-3/kepler-communications-inc-application>. You can return this by email or post to the address provided in the response form.
- A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to ngso.licensing@ofcom.org.uk, as an attachment in Microsoft Word format, together with the cover sheet.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation:
- NGSO Team,
Riverside House
2A Southwark Bridge Road
London SE1 9HA
- A1.5 We welcome responses in formats other than print, for example an audio recording or a British Sign Language video. To respond in BSL:
- send us a recording of you signing your response. This should be no longer than 5 minutes. Suitable file formats are DVDs, wmv or QuickTime files; or
 - upload a video of you signing your response directly to YouTube (or another hosting site) and send us the link.
- A1.6 We will publish a transcript of any audio or video responses we receive (unless your response is confidential).
- A1.7 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt of a response submitted to us by email.
- A1.8 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.
- A1.9 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex 4. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.
- A1.10 If you want to discuss the issues and questions raised in this consultation, please email us at ngso.licensing@ofcom.org.uk.

Confidentiality

- A1.11 Consultations are more effective if we publish the responses before the consultation period closes. This can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish responses on the Ofcom website at regular intervals during and after the consultation period.
- A1.12 If you think your response should be kept confidential, please specify which part(s) this applies to and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we do not have to edit your response.
- A1.13 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.14 To fulfil our pre-disclosure duty, we may share a copy of your response with the relevant government department before we publish it on our website.
- A1.15 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further in our Terms of Use.

Next steps

- A1.16 Following this consultation period, Ofcom plans to publish a statement. If you wish, you can register to receive email updates alerting you to new Ofcom publications.

Ofcom's consultation processes

- A1.17 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex 4.
- A1.18 If you have any comments or suggestions on how we manage our consultations, please email us at consult@ofcom.org.uk. We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.19 If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact the corporation secretary:
- A1.20 Corporation Secretary
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA
Email: corporationsecretary@ofcom.org.uk

A2 Ofcom's consultation principles

Ofcom has seven principles that it follows for every public written consultation:

Before the consultation

A2.1 Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. If we do not have enough time to do this, we will hold an open meeting to explain our proposals, shortly after announcing the consultation.

During the consultation

A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.

A2.3 We will make the consultation document as short and simple as possible, with an overview of no more than two pages. We will try to make it as easy as possible for people to give us a written response.

A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.

A2.5 A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.

A2.6 If we are not able to follow any of these seven principles, we will explain why.

After the consultation

A2.7 We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish the responses on our website at regular intervals during and after the consultation period. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

A3 Consultation coversheet

Basic details

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

Confidentiality

Please tick below what part of your response you consider is confidential, giving your reasons why

- Nothing
- Name/contact details/job title
- Whole response
- Organisation
- Part of the response

If you selected 'Part of the response', please specify which parts:

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

Yes No

Declaration

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom aims to publish responses at regular intervals during and after the consultation period. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

A4 Consultation questions

Question 1: Do you anticipate this satellite network will pose coexistence challenges to existing services?

Question 2: Are the measures set out by the applicant to enable coexistence with future systems reasonable?

Question 3: Do you assess that the measures put forward will allow this satellite network to coexist with other services?

Question 4: Do you believe the NGSO system in the application would benefit or harm competition between NGSO services in the UK? Please provide details.

Question 5: Do you have any additional concerns or comments regarding the application?